

**Marked-Up Copy Of The Amendments Submitted In Response  
To The Office Action Mailed On June 25, 2002**

**In the Specification:**

On page 38, paragraph beginning on line 14:

As used herein, “a method of treating a hydrocarbon containing formation” may be used interchangeably with “an in situ conversion process for hydrocarbons.” “Hydrocarbons” are generally defined as ~~organic material that contains~~ molecules formed primarily by carbon and hydrogen atoms. ~~carbon and hydrogen in their molecular structures.~~ Hydrocarbons may also include other elements, such as, but not limited to, halogens, metallic elements, nitrogen, oxygen, and/or sulfur. Hydrocarbons may be, but are not limited to, kerogen, bitumen, pyrobitumen, and oils. Hydrocarbons may be located within or adjacent to mineral matrices within the earth. Matrices may include, but are not limited to, sedimentary rock, sands, silicilytes, carbonates, diatomites, and other porous media.

On page 53, paragraph beginning on line 20:

As shown in FIG. 3, in addition to heat sources 100, one or more production wells ~~102~~ 104 will typically be disposed within the portion of the coal formation. Formation fluids may be produced through production well 104. ~~Production well 102 may be configured such that a mixture that may include formation fluids may be produced through the production well.~~ Production well ~~102-104~~ 104 may also include a heat source. In this manner, the formation fluids may be maintained at a selected temperature throughout production, thereby allowing more or all of the formation fluids to be produced as vapors. Therefore high temperature pumping of liquids from the production well may be reduced or substantially eliminated, which in turn decreases production costs. Providing heating at or through the production well tends to: (1) ~~prevent~~ inhibit condensation and/or refluxing of production fluid when such production fluid is moving in the production well proximate to the overburden, (2) increase heat input into the formation, and/or (3) increase formation permeability at or proximate the production well.

**In the Claims:**

2039. (amended) A method of treating a hydrocarbon containing formation in situ, comprising:  
providing heat from one or more ~~heat sources~~heaters to at least a portion of the  
formation;

allowing the heat to transfer from the one or more ~~heat sources~~heaters to a ~~selected~~  
~~section~~part of the formation;

wherein the ~~selected section~~part of the formation has been selected for heating using a  
moisture content in the ~~selected section~~part of the formation, and wherein at least a portion of the  
~~selected section~~part of the formation comprises a moisture content of less than about 15%; and  
producing a mixture from the formation.

2040. (amended) The method of claim 2039, wherein the one or more ~~heat sources~~heaters  
comprise at least two ~~heat sources~~heaters, and wherein superposition of heat from at least the two  
~~heat sources~~heaters pyrolyzes at least some hydrocarbons within the ~~selected section~~part of the  
formation from about 270 °C to about 400 °C.

2041. (amended) The method of claim 2039, further comprising maintaining a temperature  
within the ~~selected section~~part of the formation within a pyrolysis temperature range from about  
270 °C to about 400 °C.

2042. (amended) The method of claim 2039, wherein at least one of the one or more ~~heat~~  
~~sources~~heaters comprises an electrical heaters.

2043. (amended) The method of claim 2039, wherein at least one of the one or more ~~heat~~  
~~sources~~heaters comprises a surface burners.

2044. (amended) The method of claim 2039, wherein at least one of the one or more ~~heat~~  
~~sources~~heaters comprises a flameless distributed combustors.

2045. (amended) The method of claim 2039, wherein at least one of the one or more heat sources~~heaters~~ comprises a natural distributed combustors.

2046. (amended) The method of claim 2039, further comprising controlling a pressure and a temperature within at least a majority of the ~~selected section~~part of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2047. (amended) The method of claim 2039, further comprising controlling the heat such that an average heating rate of the ~~selected section~~part of the formation is less than about 1 °C per day during pyrolysis within a pyrolysis temperature range from about 270 °C to about 400 °C.

2048. (amended) The method of claim 2039, wherein providing heat from the one or more ~~heat sources~~heaters to at least the portion of formation comprises:

heating a selected volume (V) of the hydrocarbon containing formation from the one or more ~~heat sources~~heaters, wherein the formation has an average heat capacity ( $C_v$ ), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day ( $P_{wr}$ ) provided to the selected volume is equal to or less than  $P_{wr}$ , wherein  $P_{wr}$  is calculated by the equation:

——— $P_{wr} = h * V * C_v * \rho_B$

———wherein  $P_{wr}$  is the heating energy/day,  $h$  is ~~an average heating rate of the formation~~,  $\rho_B$  is an average formation bulk density, and wherein ~~the~~ an average heating rate ( $h$ ) of the selected volume is less than about 10 °C/day.

2050. (amended) The method of claim 2039, wherein providing heat from the one or more ~~heat sources~~heaters comprises heating the ~~selected section~~part of the formation such that a thermal conductivity of at least a portion of the ~~selected section~~part of the formation is greater than about 0.5 W/(m °C).

2062. (amended) The method of claim 2039, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises molecular hydrogen, wherein the molecular hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the molecular hydrogen is less than about 80 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure.

2065. (amended) The method of claim 2039, further comprising controlling a pressure within at least a majority of the ~~selected-section~~part of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2070. (amended) The method of claim 2039, further comprising:

providing hydrogen (H<sub>2</sub>) to the heated ~~section-part of the formation~~ to hydrogenate hydrocarbons within the ~~section~~part of the formation; and

heating a portion of the ~~section-part of the formation~~ with heat from hydrogenation.

2072. (amended) The method of claim 2039, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the ~~selected-section~~part of the formation to greater than about 100 millidarcy.

2073. (amended) The method of claim 2039, wherein allowing the heat to transfer further comprises substantially uniformly increasing a permeability of a majority of the ~~selected section~~part of the formation.

2075. (amended) The method of claim 2039, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 ~~heat-sources~~heaters are disposed in the formation for each production well.

2076. (amended) The method of claim 2039, further comprising providing heat from three or more ~~heat-sources~~heaters to at least a portion of the formation, wherein three or more of the ~~heat~~

~~sources~~heaters are located in the formation in a unit of ~~heat-sources~~heaters, and wherein the unit of ~~heat-sources~~heaters comprises a triangular pattern.

2077. (amended) The method of claim 2039, further comprising providing heat from three or more ~~heat-sources~~heaters to at least a portion of the formation, wherein three or more of the ~~heat-sources~~heaters are located in the formation in a unit of ~~heat-sources~~heaters, wherein the unit of ~~heat-sources~~heaters comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

2078. (amended) A method of treating a hydrocarbon containing formation in situ, comprising:  
providing heat from one or more ~~heat-sources~~heaters to a ~~selected-section~~part of the formation;

allowing the heat to transfer from the one or more ~~heat-sources~~heaters to the ~~selected-section~~part of the formation;

wherein at least a portion of the ~~selected-section~~part of the formation has an initial moisture content of less than about 15%; and

producing a mixture from the formation.

2079. (amended) The method of claim 2078, wherein the one or more ~~heat-sources~~heaters comprise at least two ~~heat-sources~~heaters, and wherein superposition of heat from at least the two ~~heat-sources~~heaters pyrolyzes at least some hydrocarbons within the ~~selected-section~~part of the formation.

2080. (amended) The method of claim 2078, further comprising maintaining a temperature within the ~~selected-section~~part of the formation within a pyrolysis temperature range from about 270 °C to about 400 °C.

2081. (amended) The method of claim 2078, wherein at least one of the one or more ~~heat-sources~~heaters comprises an electrical heaters.

2082. (amended) The method of claim 2078, wherein at least one of the one or more ~~heat sources~~heaters comprises a surface burners.

2083. (amended) The method of claim 2078, wherein at least one of the one or more ~~heat sources~~heaters comprises a flameless distributed combustors.

2084. (amended) The method of claim 2078, wherein at least one of the one or more ~~heat sources~~heaters comprises a natural distributed combustors.

2085. (amended) The method of claim 2078, further comprising controlling a pressure and a temperature within at least a majority of the ~~selected section~~part of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2086. (amended) The method of claim 2078, further comprising controlling the heat such that an average heating rate of the ~~selected section~~part of the formation is less than about 1 °C per day during pyrolysis within a pyrolysis rang of about 270 °C to about 400 °C.

2087. (amended) The method of claim 2078, wherein providing heat from the one or more ~~heat sources~~heaters to at least the portion of formation comprises:

heating a selected volume (V) of the hydrocarbon containing formation from the one or more ~~heat sources~~heaters, wherein the formation has an average heat capacity ( $C_v$ ), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day ( $P_{wr}$ ) provided to the selected volume is equal to or less than  ~~$P_{wr}$ , wherein  $P_{wr}$  is calculated by the equation:~~

~~—————~~  $P_{wr} = h * V * C_v * \rho_{B_s}$

~~—————~~ wherein  $P_{wr}$  is the heating energy/day, ~~h is an average heating rate of the formation,~~  $\rho_B$  is an average formation bulk density, and wherein the an average heating rate ( $h$ ) of the selected volume is less than about 10 °C/day.

2089. (amended) The method of claim 2078, wherein providing heat from the one or more ~~heat sources~~heaters comprises heating the ~~selected section~~part of the formation such that a thermal conductivity of at least a portion of the ~~selected section~~part of the formation is greater than about 0.5 W/(m °C).

2101. (amended) The method of claim 2078, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises molecular hydrogen, wherein the molecular hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the molecular hydrogen is less than about 80 % by volume of the non-condensable component at 25 °C and one atmosphere absolute pressure.

2104. (amended) The method of claim 2078, further comprising controlling a pressure within at least a majority of the ~~selected section~~part of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2109. (amended) The method of claim 2078, further comprising:  
providing hydrogen (H<sub>2</sub>) to the heated ~~section~~part of the formation to hydrogenate hydrocarbons within the ~~section~~part of the formation; and  
heating a portion of the ~~section~~part of the formation with heat from hydrogenation.

2111. (amended) The method of claim 2078, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the ~~selected section~~part of the formation to greater than about 100 millidarcy.

2112. (amended) The method of claim 2078, wherein allowing the heat to transfer further comprises substantially uniformly increasing a permeability of a majority of the ~~selected section~~part of the formation.

2114. (amended) The method of claim 2078, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 ~~heat-sources~~heaters are disposed in the formation for each production well.

2115. (amended) The method of claim 2078, further comprising providing heat from three or more ~~heat-sources~~heaters to at least a portion of the formation, wherein three or more of the ~~heat-sources~~heaters are located in the formation in a unit of ~~heat-sources~~heaters, and wherein the unit of ~~heat-sources~~heaters comprises a triangular pattern.

2116. (amended) The method of claim 2078, further comprising providing heat from three or more ~~heat-sources~~heaters to at least a portion of the formation, wherein three or more of the ~~heat-sources~~heaters are located in the formation in a unit of ~~heat-sources~~heaters, wherein the unit of ~~heat-sources~~heaters comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

5396. (amended) The method of claim ~~2075~~2039, wherein producing the mixture comprises producing the mixture in a production well and wherein at least about 20 ~~heat-sources~~heaters are disposed in the formation for each production well.

5397. (amended) The method of claim ~~2114~~2078, wherein producing the mixture comprises producing the mixture in a production well and wherein at least about 20 ~~heat-sources~~heaters are disposed in the formation for each production well.